

Beneficial Uses and their Current Standards (those adopted in 1995 and updated in 2006)

Estuarine Habitat

The “X2 standard” requires levels salinity to be held west of three different compliance points depending on precipitation patterns in order to increase the volume of estuarine habitats and to ensure variability from month to month and year to year.

Migration of Aquatic Organisms

Narrative standard consistent with CVPIA*. Inflow requirements on the Sacramento and San Joaquin Rivers. Closure of Delta Cross Channel to minimize diversion of Sacramento outmigrants. 1000-2000 cfs pulse flow on the San Joaquin in October.*

Spawning, Reproduction and/or Early Development

Salinities on the lower San Joaquin consistent with salinities needed for striped bass spawning*

Wildlife Habitat

Narrative standard (“conditions sufficient to support a natural gradient...characteristic of a brackish marsh.* Salinity standards for eastern and western Suisun Marsh sites. (*)

Rare Threatened or Endangered Species (“uses of water that support habitat”)

X2 standard adopted by FWS in toto as critical habitat definition for delta smelt.

Export limitations

Export:Inflow ratio (E:I) Exports cannot exceed 35% of Inflow from February through June nor 65% July through January. 31 day period of limited exports during VAMP.

Vernalis Adaptive Management Program (VAMP)

Long term experiment to quantify relative impacts of San Joaquin River flow vs South delta export rates on survival of outmigrating San Joaquin salmon.

Recent or Imminent Changes in protective measures

Biological Opinion for Delta Smelt

- Expansion of X2 requirements into fall months of wetter years

- Restrictions in Old and Middle river flows to only slightly negative at first flush to protect adults on spawning migration.

- Restriction in O&M flows and after hatching (until temperature is too warm) to protect downstream movement of young unsuitable.

Biological Opinion for salmon, steelhead, green sturgeon and southern Orcas

- Increased closure of Delta Cross Channel in fall and winter

- Restrictions on O&M flows overlapping with requirements from smelt opinion, but starting potentially earlier

- Expansion of VAMP export restrictions to 60 days. Call for continuation of VAMP experiment.

- Pulse flow on Stanislaus River in fall to attract adult steelhead

Termination of VAMP agreement in 2009/11

- New questions and new tools required, not yet fully designed.

Bay Delta Conservation Plan

New Legislation

Gaps in coverage of aquatic resource needs

1. Adult salmonid passage on San Joaquin River. Pulse flows are required in the new NMFS BO on the Stanislaus River to attract adult fish from the bay to the San Joaquin River. However, exports are allowed to be much greater than San Joaquin River inflows to the delta so that there is little likelihood any migratory cues extending through the delta. In contrast pulse flows in the spring to assist in the outmigration of young are always about 4 times the level of allowed exports. At present all San Joaquin River flows (of relatively high salinity) are exported via Old River and the central delta is filled with Sacramento River water.

Solution: require a migratory corridor of a linear salinity gradient from the Bay to the San Joaquin River long enough for adult salmon to migrate through the delta. The duration of this period probably does not need to be long, since adult salmon are good swimmers, but the longer or more frequent such conditions could be in place, the larger the number of adults likely to find their natal streams. The springtime export restrictions probably do yield similar habitat values and could be reformatted to achieve habitat goals for the re-formatted VAMP conditions.

Performance measures: suitable salinity gradients would reflect successful habitat protection. Tracking and/or counting of successful migrants would reflect the successful use of such corridors.

2. Estuarine habitat. Since delta smelt live in the estuary year-round it seems in retrospect obvious to ensure suitable volumes of habitat year-round. However, prior to 2000, exports were often limited in the fall because there were limited places to store water south of the delta and a need to empty some reservoir space for the coming water year. This resulted in amounts of estuarine habitat in the fall that varied with the amount of reservoir inflow in the preceding spring. Construction of 6 MAF of new storage space has allowed exports to be high and constant and outflows to be low and constant. These recent flows result in very limited and unvarying amounts of estuarine habitat in the fall. The new requirement for fall habitat following wet and above normal springs restores some of the previous amount and variability of estuarine habitat, but much less than occurred in some earlier years.

Solution: At a minimum the new WQCP should encompass the protection of fall estuarine habitat described in the smelt biological opinion. The biological opinion requires a number of studies of how habitat protection affects smelt. Broadening this to the needs of other species that use similar habitats and setting goals for the amount of habitat and the survival, health, fecundity and successful spawning of the fish using the habitat would provide a number of suitable performance measures.

3. Ammonia and other urban contaminant loads will increase. Ammonia/um loading is a straightforward function of human population size and wastewater treatment technology. Ammonia loads from Sacramento show a linear increase and the county population grew by 13% in the last 10 years. The SRWTP is clearly the dominant source of ammonia loading to the estuary. Permit conditions are expected to be based on new analyses of ecological impacts that

are proceeding remarkably quickly under the RWQCB in collaboration with UC Davis and several independent contractors.

BDCP assumes higher levels of exports from the delta. Thus, loadings can reasonably be expected to increase while the volume of the receiving waters decreases. A new point of diversion could also exacerbate the effects of wastewater discharge by resulting in higher concentrations. The ecological impacts of these changes should be analyzed together and control of the impacts addressed in advance. Wastewater permit requirements should reflect the impacts of expected population growth and changes in the receiving water bodies.

4. Toxicity objectives: The State Board considered adopting numeric objectives for toxicity to fish and other aquatic organisms in its recent Periodic Review but determined instead to defer to continuing work by the San Francisco and Central Valley Regional Boards. A narrative statement prohibiting toxicity in toxic amounts currently applies to contaminants not covered by numeric limits. Delta monitoring for toxicity uses a variety of methods, including lab tests for acute toxicity to sensitive amphipods and evidence of behavioral and physiological effects on fish, likely associated with chronic exposures to one or more contaminants. Work on the POD is investigating whether contaminants in water and sediment play a role in the high occurrence of disease in Delta fish species. The Central Valley Regional Board has adopted upstream TMDLs for several pesticides known to contribute to toxicity (for example, Sacramento River diazinon and chlorpyrifos). The Board is now preparing a broader "Central Valley Pesticides TMDL" that applies a new methodology for deriving criteria; draft criteria for chlorpyrifos and diuron have recently been released. Finally, State Board work on revisions to the Policy for Implementation of Toxics Standards for Inland Surface Waters relate to establishing numeric toxicity objectives and methods to determine toxicity.

Development of toxicity objectives for specific contaminants requires a series of linked activities, including appropriately designed monitoring, identification and evaluation of contaminants, and establishing a link between the contaminant(s) and effects on aquatic organisms. Where sub-lethal effects are a concern and possibly linked to low exposure levels, the ability to detect the contaminants and/or evaluate exposure pathways can be limiting. Preparation for and development of toxicity objectives should investigate the following issues:

- a. Need for a program that upgrades ambient monitoring and evaluation to measure in-situ exposures and test for sub-lethal endpoints.
- b. Consideration of how toxicity objectives can address sub-lethal effects of the chemical mixtures present in ambient water.
- c. Potential modification of permit data analysis requirements.
- d. Opportunities for better information gathering and use by enhancing sampling and monitoring design, and improving data analysis through use of new analytical methods and modeling.

5. Climate change impacts will increase through time, including flood frequency, sea level rise, and ambient temperatures. All of these changes are likely to change the needs of habitat protection. Floods, levee failures and seismic events are all likely to change the geometry of the delta and therefore the needs of protection for many of the beneficial uses of the delta. Where these changes can be predicted (similar to the linear increase of ammonia) standards should reflect the expected changes.